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TABLE OF CONTENTS

An Australian Leptanilla. *William Morton Wheeler*..... 53

On the So-called Introduction of *Heliothis dipsacea* L. into the United States. *Foster H. Benjamin*..... 58

Concerning Oudemans' "Kritisch historisch Overzicht der Acarologie" in its bearing on Nomenclature of the Moss-Mites. *Arthur Paul Jacot* 59

Muscle Variations in the Tibia of Several Species of Aphids. *Forrest W. Miller*..... 64

Swarming Chironomidæ. *J. P. Bill*..... 67

A New Species of Chironomus from Jamaica (Chironomidæ) *Bertram I. Gerry* 69

A New Species of the Genus Mydas. *Charles W. Johnson*..... 72

A New Female of Acamatus from Texas. *William S. Creighton* 73

A New Culex, *Culex vomerifer,* from Panama (Dipt., Culicidæ) *W. H. W. Komp* 79

A New Culex from Panama (Dipt., Culicidae). *W. H. W. Komp and D. P. Curry*..... 82

November Observations on *Pieris protodice vernalis* Edw. in Missouri (Lepid. Pieridæ). *Harold O'Byrne* 85

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PSYCHE

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AN AUSTRALIAN LEPTANILLA

By William Morton Wheeler

Harvard University

The very interesting Formicid subfamily Leptanillinæ comprises only two genera of minute, yellow, blind and hypogæic ants, namely, Leptanilla, established by Emery as long ago as 1870 and Phaulomyrma, established by G. C. and E. W. Wheeler in 1930 on a male specimen from Java. This genus probably also includes Santschi's *L. tanit* from Tunis. Of the eleven described species of Leptanilla, four are known only from males; of the remaining seven, five are known only from workers and only two from both workers and females. The geographical distribution of the various species is peculiar. Six of them, namely, *L. theryi* Forel, *vaucheri* Emery, *exigua* Santschi, *minuscula* Santschi, *nana* Santschi and *tenuis* Santschi, were taken in North Africa (Algiers, Tunis, Morocco), two, *doderoi* Emery and *revelierei* Emery, in Corsica and Sardinia (though the subspecies *chobauti* Emery of *revelierei* occurs in Morocco), two, *havilandi* Forel and *butteli* Forel, in the Malay Peninsula and one, *santschii* G. C. and E. W. Wheeler, in Java.

During November, 1931, while I was with the Harvard Zoölogical Expedition in Australia, Mr. D. C. Swan of the Waite Institute at Glen Osmond, S. A., generously gave me some minute ants which he discovered in Western Austra-

lia. The collection comprises two dozen workers, a female and a number of full-grown larvæ, which prove to belong to an undescribed species of Leptanilla. They therefore considerably extend the known geographical range of the genus. Owing to the fact that the Leptanillinæ are true members of Silvestri's "microgenton" and that their workers and females are very rarely seen, because they come to the surface of the soil only under unusual conditions, such as excessive rainfall, it is too early to regard the various species at present known as covering the entire range of the genus. We should expect careful collecting with the Berlese funnel to bring additional forms to light in South Africa, Madagascar, Asia Minor and India, or even, perhaps, in the warmer parts of the New World.

Leptanilla swani sp. nov.

Worker. (Fig. 1, a-d.) Length 1.3-1.5 mm. Pale yellow; legs scarcely paler than the body; teeth and borders of the mandibles reddish.

Head flattened above, oblong, fully 1½ times as long as broad, as broad in front as behind, with subparallel sides, rounded posterior corners and feebly concave posterior border. Mandibles narrow, with very oblique 4-toothed apical borders, the terminal tooth curved and acute, the second minute, the two remaining teeth stout and rather blunt, the most basal directed at right angles to the apical border or even slightly backward. Clypeus without distinct posterior suture, its anterior border slightly but distinctly produced in the middle as a broadly rounded lobe, excised at the sides. Antennæ moderately stout; scapes reaching nearly to the middle of the head; basal funicular joint nearly 1½ times as long as broad, ovoidal, with constricted base; joints 2-6 distinctly broader than long; the second basally constricted, the seventh distinctly longer, 8-10 as broad as long, the terminal joint as long as the two preceding joints together. Thorax much narrower than the head including the mandibles, flattened dorsally and not deeply notched in profile at the promesonotal suture; pronotum subovoidal, somewhat broader than the mesepinotum, which is longer than the pronotum, with feebly rounded, subparallel sides. Petiole much narrower than the epinotum,

nearly 1½ times as long as broad, gradually narrowed anteriorly, posteriorly with rounded-subparallel sides. Postpetiole rounded-trapezoidal, nearly as long as broad, somewhat broader than the petiole and somewhat wider behind than in front, its ventral surface convex and projecting. Gaster narrow, elongate-elliptical, anterior border of first segment slightly concave. Sting large, retracted. Legs mod-

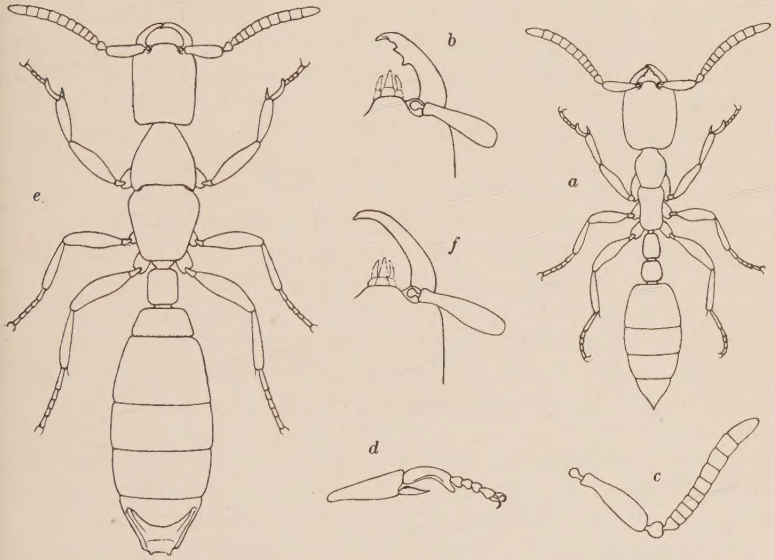


FIG. 1. *Leptanilla swani* sp. nov. *a*, worker; *b*, clypeus and mandible of same; *c*, antenna; *d*, fore tibia and tarsus; *e*, female; *f*, clypeus and mandible of same.

erately stout, tips of fore metatarsi produced and digitiform, but not so narrowly as in *L. nana* Santschi.

Shining, with very fine and indistinct piligerous punctures. Pilosity white, very short, abundant both on the body and antennæ, slightly longer and coarser on the gaster, less conspicuous and more dilute and appressed on the legs.

Female. (Fig. l, e and f.) Length 2 mm.

Color, sculpture and pilosity as in the worker, but the hairs on the gaster very long, though fine, as in the female of *L. theryi* Forel.

Apterous and resembling the worker in form but differing in the following characters: Head more sharply oblong, with straight and more clearly parallel sides. Mandibles falcate, narrow and tapering at the tips, without distinct basal and apical borders, terminating in two small, indistinct, closely approximated teeth. Clypeus broader and less produced than in the worker. Thorax decidedly longer than the head plus the mandibles, very low and flat above, the pronotum posteriorly nearly as broad as the head, longer than broad, with feebly rounded, anteriorly converging sides, mesepinotum broader than the head, subtrapezoidal, broadest near the anterior end, roundly subtruncate behind. Promesonotal suture pronounced, straight and transverse in the middle. Petiole regularly oblong, about 1¼ longer than broad, as broad in front as behind. Gaster much larger than in the worker, the postpetiole, which forms its first segment, nearly twice as broad as long, subtrapezoidal, with straight anterior border. Genitalia similar to those of *L. revelierei* Emery, but the pygidium with entire, broadly and semicircularly rounded posterior border, not notched in the middle. Hypopygium large, narrowed and bluntly bidentate posteriorly. Legs longer and stouter than in the worker.

Described from 24 workers and a single female taken Oct. 10, 1931 by Mr. D. C. Swan under a large stone at Goyamin Pool, Chittering, Western Australia.

L. swani seems to be most closely related to *L. revelierei*, but the female of the latter has a much shorter petiole. In the long pilosity of the gaster the female of the new form resembles *theryi*, but in this species the petiole is very different, being distinctly cordate anteriorly instead of oblong.

Dr. G. C. Wheeler, to whom I sent the larvæ of *L. swani* for study, writes me that he found them "extremely interesting because of their close resemblance to the larvæ of *revelieri* subsp. *sardoa*. They even have the 'tympanum' which is difficult to detect unless the specimens are stained. This species differs from *sardoa* in the following characteristics: (1) The head is sharply constricted just in front of the middle so that in dorsal view it is flask-shaped or key-hole shaped; the posterior half is circular, the middle half

is about half as wide and has subparallel sides. (2) The prothorax is sparsely spinulose while the curious structure on its ventral surface has its base densely and coarsely spinulose. (3) The two extremely long hairs at the posterior end are lacking in all specimens."

Emery, as is well known, regarded the Leptanillinæ as constituting a special tribe of the Dorylinæ, but Dr. G. C. Wheeler and I have raised the group to subfamily rank. Unquestionably, Emery, in his paper of 1904, based his opinion very largely on the singular characters of the female, which he regarded as a true dichthadiigyne and compared with the female of Aenictus. Strangely enough, Emery seems not to have noticed the peculiar falcate shape of the female mandibles, so unlike those of the worker, a character which, taken together with the absence of wings and the single segment of the pedicel, makes the resemblance to the females of the Dorylinæ even greater than he supposed. But the males of the Leptanillinæ and the larvæ, as described and figured by G. C. Wheeler, are so very unlike those of the Dorylinæ that we are bound to regard the striking similarities of the females as due to convergence. Emery's original interpretation of the thoracic segmentation of the female Leptanilla was incorrect, because he regarded the portion of the thorax anterior to the pronounced transverse dorsal suture as the mesonotum, the portion posterior to the suture as the combined metanotum and epinotum. In a foot-note to his section on the Leptanillinæ in the "Genera Insectorum" (1910), he recognized his error and adopted the interpretation which I have also reached, namely, that the presutural portion is the pronotum, the postsutural the combined meso- and epinotum.

The occurrence of indigenous species of Leptanilla on islands like Corsica, Sardinia, Java and Australia is significant. Since the females are apterous and obviously too small and delicate to endure distant transportation in flotsam and jetsom, we must suppose that they have occupied their present habitats since the islands mentioned were connected with the mainland. The Leptanillinæ, therefore, must be very ancient, like many other components of the microgenton (Kœnenia, Pauropus, Scolopendrella, Campodea, Iapyx, etc.) *L. swani* is particularly interesting in

this connection, because the extreme southwestern corner of Australia, in which it was taken, is known to possess the oldest and least disturbed fauna of any portion of the continent.

Literature

Emery, C. Studi Mirmecologici. Bull. Soc. Ent. Ital. 2, 1870, pp. 193-201, 1 pl.

Emery, C. Le affinità del genera Leptanilla e i limiti delle Dorylinæ. Archiv. Zool. Ital. 2, 1904, pp. 107-116, 9 figs.

Emery, C. Formicidæ, subfam. Dorylinæ, in Wytsman's Genera Insectorum, 1910, pp. 32-33.

Wheeler, G. C. The Larva of Leptanilla. Psyche 35, 1928, pp. 85-91, 1 fig.

Wheeler, G. C. and *E. W.* Two New Ants from Java. Psyche 37, 1930, pp. 193-201, 2 figs.

ON THE SO-CALLED INTRODUCTION OF HELIOTHIS DIPSACEA L. INTO THE UNITED STATES

By Foster H. Benjamin

Bureau of Entomology, United States Department of Agriculture

Throughout the earlier literature there are scattered references of the occurrence within North America of this Palearctic Heliothid. All of these seem to apply to the indigenous *Heliothis phloxiphagus* Grote and the name was dropped from the more recent lists.

A paper by Mr. Fred H. Walker was published in 1928 (Psyche, XXXV, 29-30), definitely stating that the European species actually did occur in Massachusetts.

Through the kindness of Mr. C. W. Johnson one of the Walker specimens was submitted for examination. Both upon superficial characters and upon male genitalia it is the ordinary American *phloxiphagus*.

CONCERNING OUDEMANS' "KRITISCH HISTORISCH OVERZICHT DER ACAROLOGIE" IN ITS BEARING ON NOMENCLATURE OF THE MOSS-MITES

By Arthur Paul Jacot

Monroe, Conn.

As supplements to the Tijdschrift voor Entomologie, vols. 69 and 72 (1926 and 1929), and comprising 500 and 1097 pages of text, Dr. A. C. Oudemans reprints most of the text and figures of *all* literature on the Acarina previous to 1805, adding his comments and interpretations of identities. Since pre-Linnean references are of no systematic or nomenclatorial interest, they are not considered in the present review unless an earlier edition or description throws more light on a post-Linnean species of the *same* author. I have no faith in the descriptions or redescriptions or identifications or reidentifications of any one species by *different* authors in those early days, even though bearing the same specific name. This is an important principle which will be dwelt on more fully where it is a case in point. The following appear first:

Acarus scaber Linné 1758

(Oudemans, part I, pp. 347-348; part II, pp. 771-773)

In this case it is legitimate to go back to the Fauna Suecica, Ed. I (by the same author), although pre-Linnean and nonbinomial, to get the fuller description. This Linné intended us to do. It saved reprinting much material.

The words in this description "podex depressus, bidentatus" fits only some species of Michael's Nothrus, namely: *N. bicarinatus* Mich., *N. biverrucatus* Mich., *N. targionii* Mich. and *N. segnis* Mich. (without the nymphal skin). *N. horridus* is quadridentate. All these are yellow to dull brown (not dark grey), but "rough and . . . thickly

strewn with irregular, short, villous processes" and carry much dirt so that "neither colour, texture, nor markings can be seen" (except *N. targionii* Mich.). Thus Linné's color and texture characters are not specific (except that they throw out *N. targionii*), the color *possibly* being that of the extraneous matter coating the back and the scabrousness may also be due to this "stucco."

The only species of this restricted group recorded as found in Sweden by Tragardh is *N. segnis*. Michael (1888, p. 514) says that *N. biverrucatus* is not common, that *N. bicarinatus* (p. 517) is common but arboreal, and that *N. segnis* (p. 521) is "chiefly found at the roots of mosses (on the ground) . . . not very common . . . I have found it in Norway." In connection with Michael's figures it must be remembered that figure 1 (of *N. segnis*) is with nymph skin but that figure 6 (shaded portion) is what the *podex* looks like without the skin, thus being even more conspicuously bidentate than *N. biverrucatus!* Thus, until there is further evidence to the contrary I must regard *N. segnis* Michael a synonym of *A. scaber* L.

Turning to Hermann's *N. segnis* one is struck by the strongly bidentate podex, and the words "d'un cendré noirâtre" which immediately recalls Linné's "obscure cinereum." Finally as Hermann's figure shows the pseudostigmatic organ standing out beyond the body while in the adult they are much shorter, one must conclude that either he had before him some *N. horridus* as well as true *N. segnis* or that he figured a *nymph* of *N. segnis*. This latter seems still more certain from the fact that he omits the prominent rostral bristles. On the other hand, three claws are figured. As the figure is thus very evidently based on more than one individual and even more than one species, I would restrict only that part of the description and figure which refers to color (and pattern), bidentate podex and pseudostigmatic organs as type of Camisia Heyden. *Acarus scaber* Linné 1758 thus becomes *Camisia scaber* (Linné).

Oudemans's only comment is, "This description betrays at once *Camisia biverrucatus* C. L. Koch." This is an opinion, not evidence.

Of the 18 other references given by Oudemans, 17 of them are of relists in compilations and translations, or later

editions or reprints and therefore of no systematic or biological interest, and one is *Acarus plantarum* Mayer 1781 which Oudemans considers a synonym.

Acarus plantarum Mayer is not a typical Nothrus because the abdomen is described as "at the breast somewhat compressed, broader and round towards the hind region." If it were *N. biverrucatus* or a related form, the subparallel sides and especially the two horned posterior end would have been mentioned. The color characters recall a *nymph* somewhat like that of *H. bistriata* Michael (1888, pl. 42, fig. 9—but this is "eyeless"!). Certainly it is not an adult, for even the legs are alternately grey and black!

Acarus geniculatus Linné 1758

(Oudemans, part I, pp. 348-353; part II, pp. 775-782.)

Under this head Oudemans marshals about 55 references (to 1805) many of which being non-binomial, later editions, translations and compendiums do not concern the systematist. Nine, however, were distinctly published as original descriptions of formerly unrecognized species, namely, those of 1665, 1668 (see pt. 2, p. 775), 1764 Linné (=1758), 1752, 1763 Scopoli, 1776 Schrank (=1781), 1778 DeGeer, 1799 Rathke, 1800 Shaw. Of these, those of 1665, 1668 and 1752 are not binomial scientific names, and only Linné's is a genotype! Are these really all synonymous?

I cannot determine from these descriptions what resemblance *A. lichenum* Scopoli has to *A. geniculatus*. It is from Carniola (Krain, Austria), not Utrech, Holland.

A. musci Schrank 1781 (described in greater detail in 1776) from the figure looks like still another species and also comes from Austria. It will probably be many years before this species can be properly reidentified.

A. corticalis DeGeer 1778. Presumably Oudemans expects us to identify this species with the species figured by him in part I, p. 351. This can hardly be done because (1) DeGeer's species is shining (not punctured), (2) there is a distinct depression across cephaloprothorax between insertions of legs I, (3) the long bristles on legs are not on apex of tibia, (4) there are more abdominal hairs than in Oudemans's figure. As stated before (Jacot 1929g, p. 417, last paragraph), I consider DeGeer's *Acarus corticalis* as en-

tirely distinct from *A. geniculatus* as the color and shape of femora are different and because *A. corticalis* was described in 1778 when DeGeer was well aware of *A. geniculatus*. Oudemans, on the other hand (part II, p. 779) claims the two to be identical and thinks it "strange" that DeGeer should have used a new name and made no mention of *A. geniculatus*. Since the two are described as different, DeGeer was right in giving his *later* find a new name. Thus we are limited to Linné *only* for the description of *A. geniculatus*.

Trombidium corticale Rathke 1799 is a Norwegian species which will also have to await reidentification. This should be possible by a thorough study of all Oribatids which may be found in the same type of environment in that part of Norway.

Acarus coleoptratus Shaw 1800. A comparison of his figure with that of Hooke 1665, will show considerable difference. Further, Shaw says his species is "somewhat glossy," while Hooke says "indented or pitted with an abundance of small pits, all covered over with little white bristles." Shaw distinctly shows two nails per foot, Hooke but one (yet Hooke saw punctures). The reidentification of Shaw's species will not affect nomenclature.

Thus of the six species placed by Oudemans under one term, we find that on careful examination none are synonymous.

In a similar way one may go through the remainder of his compendium. His task was stupendous and would need years of detailed work in various countries before it could be presented as a final piece of work.

One thing Oudemans has done for which Acarologists should be grateful and that is he has brought together all early references on the group and with this as a broad working basis we can each contribute our share towards clearing up certain species.

A careful perusal of Oudemans's comments on the various species reveals a well marked tendency on his part to state that the description or figures are incorrect if they do not fit the species which Oudemans has decided they should represent. This type of historical criticism carried on without a first hand knowledge of the local fauna con-

cerned is thin ice. Each of these attempts at reidentification will have to be reconsidered without prejudice.

Oudemans has thus brought together for future study 29 pre-Hermannian species, each so poorly described as to require expert knowledge of most species at the locality from which they came or as to require their being considered *nomina nuda*. The list, chronologically arranged, follows.

Acarus coleoptratus Linné 1758; Sweden.
" *geniculatus* same; Utrech, Holland.
" *fungorum* same; Sweden.
" *scaber* same; Sweden.
" *tremellæ* Linné 1761; Sweden.
" *muscorum* Scopoli 1763; Carniola (Krain, Austria).
" *lichenum* same; same.
" *piger* same; same.
" *spinipes* O. F. Muller 1776; Denmark.
" *lichenum* same; possibly an Oribatid; *not* Scopoli.
" *seminulum* same; Denmark.
" *corticalis* DeGeer 1778; Utrech, Holland.
" *marginatus* same; same; *not* Sulzer 1776, a tick.
" *plantarum* Mayer 1781; Germany.
" *confervæ* Schrank 1781; Austria.
" *coleoptratus* Schrank 1781; same; *not* Linné.
" *geniculatus* same; same; *not* Linné.
" *musci* same; Austria.
" *lucidus* Fourcroy 1785; France.
" *scaber* Rathke 1799; Bergen, Norway; *not* Linné.
Trombidium corticale Rathke 1799; Bergen, Norway.
" *coleoptratum* same; same.
" *loricatum* same; same.
Acarus coleoptratus Shaw 1800; England; *not* Linné.
" *infusionum* Schrank 1803; Bayern.
" *planicornis, xylariæ ciliatus, alatus* all same.

The six synonyms might be allowed to die of neglect; their reidentification would not affect subsequent nomenclature. Should a 90 per cent vote to disregard the remaining twenty-three species, cast by present day Acarologists who have studied the Oribatoidea, be considered sufficient opinion to rule these authors out of systematic literature? Or should they be retained as about 23 unavoidable nomenclatural changes for the future?

References not in Oudemans.

Michael, A. D. 1888, British Oribatidæ, vol. 2, pp. xi and 337-657. pls. 25-54.

Jacot, A. P. 1929 (Oct.-Nov.) Genera of Pterogasterine Oribatidæ (Acarina), Trans. Amer. Micro. Soc., vol. 48, pp. 416-430.

MUSCLE VARIATIONS IN THE TIBIA OF SEVERAL SPECIES OF APHIDS

By Forrest W. Miller

Department of Zoölogy, University of Pittsburgh

Uichanco[1], who has studied the muscles and movement of the tarsus of *Myzus persicæ,* states that there is a single extensor muscle which moves the tarsus. He concludes that this condition holds for all species of aphids. Weber[2] reviews the same idea set forth by Uichanco and also gives this condition as generally occurring among the aphids.

A study of several species of aphids shows that there are some variations from the above stated generality. This variation occurs in the number of extensor muscles and, where there is a single muscle, within the muscle itself.

In all the species used for study, several specimens were stained with eosin and mounted in balsam, others were unstained and mounted in euparol. With both of these methods the muscles show up very well after the specimen has cleared. Both alate and apterous forms were included in the study. Examination of mounted material was made under the high power of the microscope (440x), and of live material under the binocular microscope (50x).

The following species were examined: *Aphis sambucifolii, Aphis rumicis, Aphis feminea, Amphorophora cosmopolitania, Eriosoma lanigerum, Drepanaphis acerifolii, Colopha ulmicola, Macrosiphum granarium* and *Schizoneura americana.*

All of these species are characterized by the absence of the flexor muscle[3]. In none of them was the writer able to

[1]Uichanco, L. Muscles and Movement of Tarsus of Aphids. Psyche, Vol. 28, 1921.

[2]Weber, H. Biologie der Hemipteren. Springer, Berlin, 1930.

[3]The muscles and the parts of the legs are named with respect to the appendage when in its natural position.

determine the presence of a proximal elongation of the first tarsal segment, for the insertion of the extensor muscle, as described by Uichanco. The extensor muscle is inserted directly on the endo-proximal edge of the first tarsal segment as may be seen in the drawings. In some cases (Fig. F) this muscle arises on the proximal end of the tibia, where there are two points of origin, one on the endo-proximal, and the other on the ecto-proximal wall of the segment. From this origin the muscle passes outward through the segment as a very thin tendon-like muscle. Just before the insertion on the tarsus, however, this muscle becomes very wide and again abruptly narrows down into a tendonous insertion on the first tarsal segment. (Figs. A, G.) This muscle is called the extensor by Uichanco.

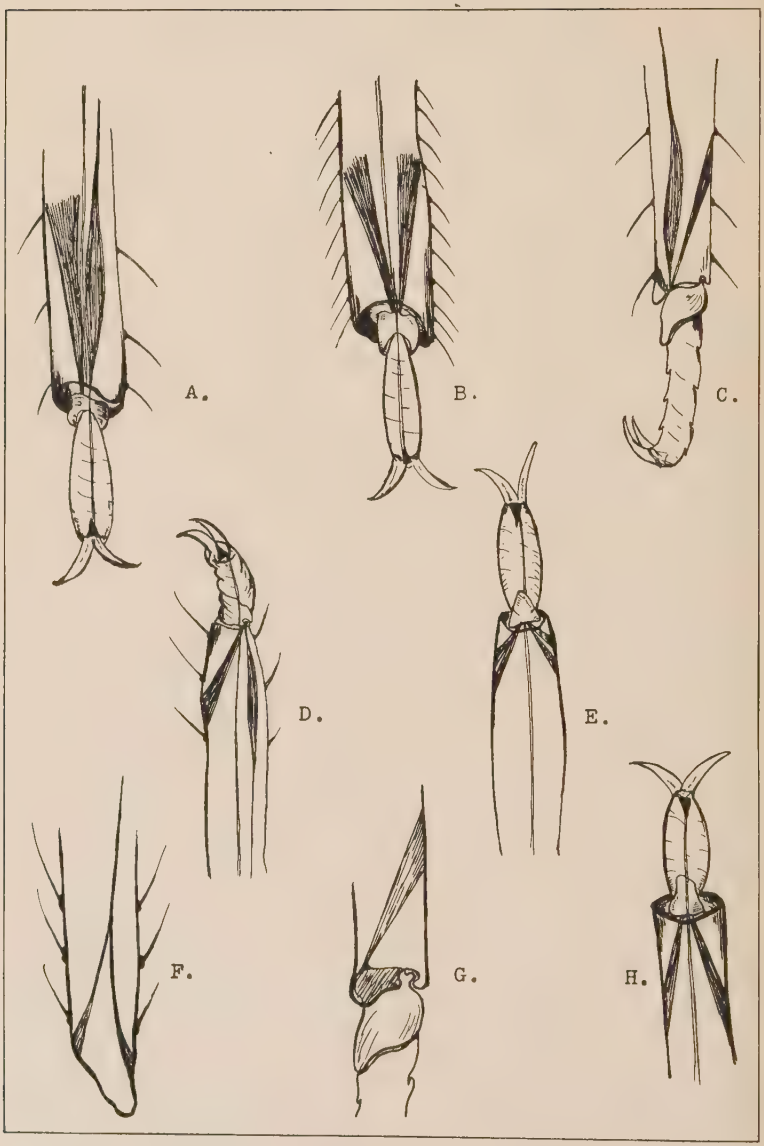
A second muscle (extensor) appearing in the species studied, is very short and much wider than the first muscle mentioned. This one arises on the lateral wall of the tibia, slightly distad from a point midway between the proximal and distal ends of the segment. From this origin, which is rather wide, the muscle passes out to the tendon-like insertion on the endo-proximal edge of the first tarsal segment.

The combination of the above mentioned muscles has been observed in *Colopha ulmicola, Aphis rumicis* and *Amphorophora cosmopolitania.* (Figs. A. D.) In some cases the extensor muscle which arises in the proximal end of the tibia is absent. In this case a short muscle, similar to the second extensor muscle mentioned, replaces it. This is found in *Aphis sambucifolii, Drepanaphis acerifolii* and *Aphis feminea.* (Figs. B, H.) A further variation is found in the muscles of *Eriosoma lanigerum.* Here there are four small extensor muscles. (Fig. E.)

The function of the missing flexor muscle is taken over by "the tension of the wall of the tibia." [1] The fulcrum upon which the tarsus moves is located at the ecto-distal end of the tibia. (Fig. G.) The first tarsal segment increases slightly in width from the proximal to the distal end. When the extensor muscle contracts, it draws the first segment of the tarsus into the cavity of the tibia, and thus, since the tarsus is of slightly increasing greater width, a tension is

[1] All quotations are from Uichanco.

Psyche, 1932 Vol. 39, Plate 2



Miller—Tibial Muscles of Aphids.

placed on the wall of the tibia. "It appears that the wall of the tibia performs the function of the lost antagonistic muscle of the tarsus of aphids." No articular membrane could be seen.

Species represented on Plate II.

A. *Aphis rumicis*
B. *Aphis feminea*
C. *Drepanaphis acerifolii*
D. *Colopha ulmicola*
E. *Eriosoma lanigerum*
F. *Schizoneura americana*
G. Articulation of tarsus and tibia (diagrammatic)
H. *Aphis sambucifolii*

SWARMING CHIRONOMIDÆ

By J. P. Bill

One evening during the spring grass fire season, the writer happened to notice some suspicious streamers of what appeared to be smoke. They proved to be above a large elm tree several hundred feet away, where they caught the quartering light of the setting sun. The children soon found others. In fact, all around us, against the sky, could be seen these columns, slightly swaying in the breeze, and all apparently tenuously anchored to tree tops. The nearest one, over a young elm sapling in our own yard, was close enough to determine the smoke to be columns of myriads of insects.

An aërial net lashed to an apple picker was barely long enough to sweep through this column, which proved to consist of Chironomids. These were identified later by Mr. C. W. Johnson of the Boston Society of Natural History (with whom specimens were left, and to whom my thanks are due) as being *Chironomus modestus* Say, *Cricotopus trifasciatus* Panzer, and *Chironomus nigricans* Johannsen, the latter predominating in the collections, of which three were made on different days.

For the next few days, in travelling about the region of Wayland, these columns were seen at sunset, and were observed by others. One sunset was accompanied by a fitful westerly wind. While the columns were temporarily dispersed, the insects quickly flew back to their position, which they maintained even in the height of the gusts.

Toward the end of approximately a week, during which these columns were seen in the evening, large numbers of them started to appear in the writer's study, where a valved screen frame, backed by a light, is in nightly use to attract insects. Their disappearance at light was coincident with that of the columns.

Whether this phenomenon is one of a modified swarming instinct or nuptial flight is not known to the writer, but its persistence and peculiarity is thought worthy of note. These observations were made during the first week in May, 1931.

A NEW SPECIES OF CHIRONOMUS FROM JAMAICA (CHIRONOMIDÆ)

By Bertram I. Gerry

Department of Agriculture, Boston, Mass.

While examining some chironomid material, collected in Jamaica by W. S. Brooks and donated to the Museum of Comparative Zoology at Harvard University, my attention was drawn to several specimens which appeared to be representatives of *Chironomus varipennis* Coquillett, with a somewhat modified wing spotting.

Since the original description of *C. varipennis* is rather meager, and neither the male genitalia figured nor the ratio between fore tibia and fore metatarsus mentioned; one must rely, almost entirely, upon the wing characters in identifying this species.

Malloch (1915) attempted to add to the original description but since the specimens in his possession, apparently, were badly mutilated, he succeeded in contributing but a single salient fact, namely, that the fore tarsi were much elongated—the basal segment being twice as long as the fore tibia.

Fortunately, I succeeded in finding in the Harvard collection additional material (collected by Professor Nathan Banks at Falls Church, Virginia), which coincided with the original description of *C. varipennis* from the standpoint of wing venation, and with Malloch's statement that, in this species, the fore metatarsus is twice as long as the fore tibia.

This, I believe, definitely establishes *C. varipennis* which I have redescribed in this paper. The material from Jamaica, which differs from *C. varipennis* in respect to body and leg markings; wing spotting, ratio between fore tibia and fore metatarsus, and structural characters of the male genitalia, I hereby submit as a new species.

Chironomus varipennis Coquillett

Male.—Dark brown. Head brown; antennæ yellow, plumes concolorous, scape dark brown; palpi yellowish. Thorax brown, mesonotum and pleuræ with uneven silvery pruinescence; scutellum brown; postnotum brown with two lateral pruinescent spots; halters yellowish white. Abdomen fuscous, the posterior margin of segments narrowly pruinescent; sixth, seventh and eighth blackened dorsally. Legs brown with whitish tarsi; fore femora brown with wide central yellow bands; fore tibiæ brown with distinct pre-apical yellow rings; fore metatarsi whitish, apices narrowly brown, more than twice as long as fore tibiæ (34-15). Mid and hind legs clothed with long yellow hairs; femora yellow, bases brown; tibiæ yellow with narrowly brown apices; tarsi yellowish white, all segments narrowly brown at apices. Wings whitish, with eleven pale blackish spots, iridescent in reflected light and located as follows: three in a row behind the cubitus, one before middle and another in middle of apical margin of (Cu_1), one in base of cell (R_{4+5}), another in cell below it, a third midway between the latter and base of this cell, one in middle and another at apex of cell (R_{4+5}), and a small spot at apex of cell (M_1). Hypopygium with side piece terminating in large blunt cylindrical appendage, not densely clothed with long hairs, the dorsal spine short and inconspicuous.

Female.—Similar to the male in coloration, but in some specimens the thorax may be almost black and the abdominal segments more extensively pruinescent.

Length.—3 mm., coll. by Nathan Banks, Falls Church, Va. June.

Chironomus pseudofasciata sp. nov.

Male.—Blackish brown, shining. Antennæ dark brown; plumes fuscous, scape blackish. Thorax dark brown, shoulders with silvery pruinescence; a median silvery stripe extending half way from prescutum to scutellum; on either side of mesonotum, a narrow silvery stripe extending from silvered shoulder to base of scutellum. The thoracic markings obscure in some specimens. Halters yellowish white. Abdomen blackish; segments with narrow silvery apical bands, widened medially to form V-shaped spots. Legs

brown, banded with yellow; coxæ blackish; femora brown with subapical yellow ring; tibiæ predominately yellow, a narrow brown subbasal ring and a second narrow brown ring half way between mid-point and apex; tarsi brown with yellow bands, basal segment brown with wide central yellow band, remaining segments brown with yellow apical ring, these rings often extending beyond joint and involving base of following segment. Fore metatarsi, less than one and one-half times length of fore tibiæ (18-14). Wings with nine black spots; the five large spots at middle forming two false fasciæ, two of the remaining spots at apex (one on either side of media), the other two at base. Distal fascia, located half way between cross-vein and apex; consisting of large squarish spot below apical portion of vein (Cu_1), the second spot directly above in cell (R_{4+5}), the fascia completed centrally by distal portion of large rectangular spot in cell (M_1). Proximal fascia, immediately beyond cross-vein, consisting of squarish spot involving junction of veins (Cu_1) and (Cu_2) and extending to posterior margin of wing, the second spot directly above in basal portion of cell (R_{4+5}), completed centrally by proximal portion of large rectangular spot in cell (M_1). The basal spot in anal area usually circular, the other triangular in outline. Hypopygium with side piece terminating in sickle-shaped appendage, densely clothed with numerous long hairs. A long dorsal spine, ventrally curved.

Female.—Similar to the male in coloration.

Length.—2.50 mm. to 4.00 mm.

Coll. by W. S. Brooks, Moneague, Jamaica. February.

Faded specimens may sometimes resemble *C. varipennis* but the two species are easily separated on the basis of structural characters found in the male gentalia.

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Malloch, J. R. (1915) Bull. Ill. Sta. Lab. of Nat. Hist., vol. X, art. VI, p. 427.

A NEW SPECIES OF THE GENUS MYDAS

By Charles W. Johnson
Boston Society of Natural History

The following species of Mydas from Yucatan and Guatemala were received from Dr. Jos. Bequaert for determination.

Mydas perpolitus sp. nov.

Head black, somewhat shining, pile on the front and vertex black, on the face and sides near the base of the antennæ white, pollen and pile on the occiput white. Antenna black, the enlarged apical portion dark brown. Thorax dull black, in certain light there are indications of three obscure stripes, scutellum black. First abdominal segment dark bluish black, shining, and with fine short black hairs, the other segments are dark blue, highly polished, and with very minute black hairs, the venter has the same color and polish, hypopygium dark brown, with quite long black hairs. Legs black with black hairs, ungulæ brown with black tips, pulvilli yellow, posterior femora thickened, this portion bearing two rows of thickened spines below. Wings brownish black, with lighter streaks in the middle portion of many of the cells, halteres black. Length 22 mm. The paratype measures 19 mm.

Two males from Chichen Itza, Yucatan, Mexico, June 29, 1929. Collected by Dr. Jos. Bequaert. Holotype and paratype in the Museum of Comparative Zoölogy, Cambridge, Mass. In my key[1] it would run to section 4 and follow *M. carbonifer* O. S. from which it is readily separated by its dark blue and highly polished abdomen.

Mydas bitæniatus Bellardi

One male of this species was collected by Dr. Jos. Bequaert at Zacapa, Guatemala, May 9, 1931. It is in the Museum of Comparative Zoölogy.

[1]Proc. Boston Soc. Nat. Hist., vol. 28, p. 133, 1926.

A NEW FEMALE OF ACAMATUS FROM TEXAS

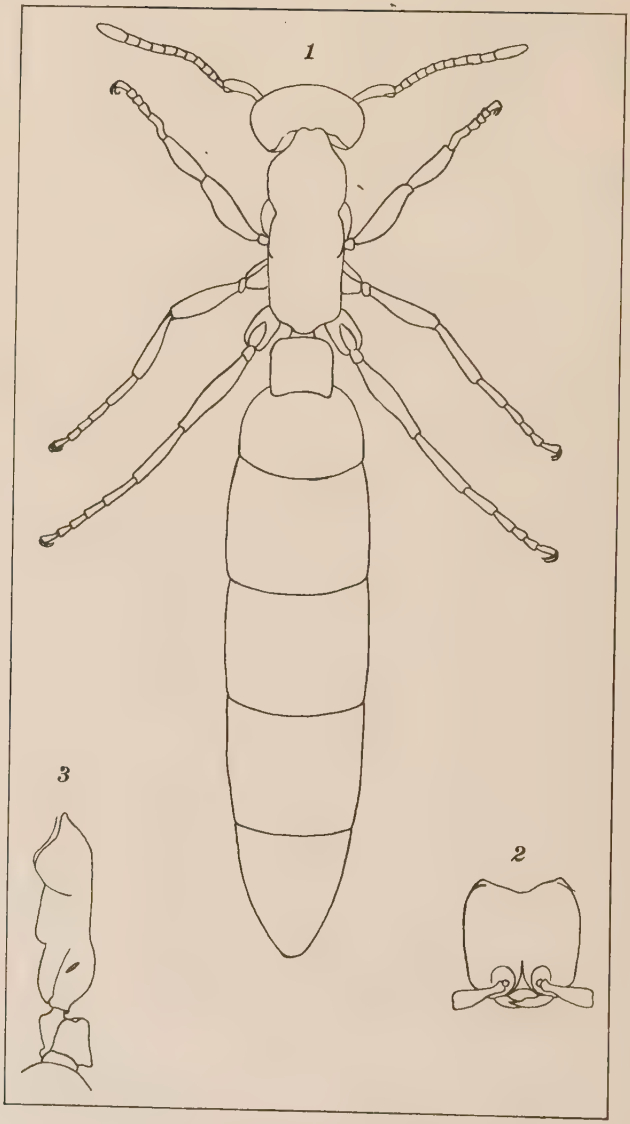
By William S. Creighton
Department of Biology, College of the City of New York

It has now been almost half a century since Ernest André gave us the first description of one of the peculiar apterous females of the New World legionary ants. Contrary to custom the recognition of this caste added further complexity to an already difficult problem since it showed that the female Eciton as well as the male cannot be correlated with the worker caste by the usual structural criteria. Fortunately the female is not likely to be taken alone but the extreme rarity of this caste and the difficulties attendant upon the capture of some of these insects have greatly impeded our knowledge of the sexual forms of Eciton. The activities of a number of investigators, not infrequently undertaken at considerable personal risk, have resulted in the discovery of females belonging to about a dozen species. There remain, however, almost three times this number of species known only from the worker caste and a large number of described but uncorrelated males. Under such circumstances it is very gratifying to have the privilege of describing another female of these curious insects.

Through the courtesy of Dr. Herbert Ruckes of the Department of Biology of the College of the City of New York, the author was given a colony of Acamatus taken by Dr. Ruckes near Ft. Worth, Texas. This colony contained numerous workers and a single female. I wish to thank Dr. Ruckes for his generosity and to congratulate him upon his good fortune in finding one of these rare insects.

A comparison of the workers from the above colony with material in my collection indicated that they belonged to Emery's species *wheeleri*. In order to make certain of this determination specimens were sent to Dr. W. M. Wheeler for comparison with type material. Dr. Wheeler, who very

Psyche, 1932 Vol. 39, Plate 3



Creighton—Female of Acamatus.

kindly made the necessary examination, writes me as follows:

"I have compared your specimens of *Acamatus* with the types of *wheeleri* Emery in my collection. They differ from these types in having a somewhat shorter head with less produced posterior angles and both the head and promesonotum are distinctly smoother and more shining. In the typical *wheeleri* the whole thorax is sculptured and subopaque. I believe, therefore, that your form may be regarded as a new subspecies or the hereto unknown worker of one of the Texan species known only from males."

It is much to be regretted that no males were present in the colony since their absence reduces any attempt to correlate this form with a previously described male to pure speculation. It had best, therefore, be regarded as a subspecies of *wheeleri* until the time when the discovery of a nest containing all the castes will definitely settle the question. In any case the female warrants description since it is markedly different from those of the three North American species of *Acamatus* in which this caste is known.

Eciton (Acamatus) wheeleri subsp. **dubia** subsp. nov.

Worker: Head shorter than that of the typical *wheeleri*, the posterior angles less produced; head and promesonotum smoother and more shining. Otherwise as in the type.

Female: (Plate III, figs. 1, 2 and 3.) Length 13.5 mm. Head, thorax and petiole 4 mm. Gaster 9.5 mm.

Head subquadrate, the sides straight and very slightly convergent in the anterior half, feebly convex in the posterior half. Occiput produced behind into two well-marked lobes each of which passes ventrally to a blunt but distinct angle at the inferior border of the occiput. The middle of the occiput with a prominent, rounded, median groove. Ocelli absent. Eyes consisting of two or three indistinct, unpigmented and depressed facets which lie a little behind the middle of the side of the head. Anterior border of the clypeus evenly concave. Antennal carinæ rather short, the anterior portion partially encircling the antennal fossa, the posterior part fusing with the front a short distance behind the insertion of the antenna. A long, depressed triangular area between the carinæ extends well back behind the pos-

terior borders of the antennal fossæ (about one-third the length of the head). Mandibles linear with a single acute terminal tooth, the outer border feebly convex, the inner border feebly sinuate. Antennal scapes short, strongly curved and very much enlarged toward the tips. The scape, which is approximately one-half the length of the head, is slightly more than one-third as long as the funiculus. First funicular joint notably smaller than the rest, slightly longer than broad; second joint trapezoidal about as long as broad; the remaining joints all longer than broad, gradually increasing in length apically, the terminal joint bluntly pointed and slightly longer than the two preceding joints taken together.

Thorax two and two-thirds times as long as broad, the dorsum entirely without sutures; pronotum from above subpentagonal, its posterior border marked by a prominent impression in the side of the thorax; mesonotum and epinotum from above forming a single rectangular area having slightly rounded posterior angles and a small, rounded, median projection on the posterior face of the epinotum. Seen from the side the thorax is approximately four times as long as high, the pronotum evenly rounded in front and passing without transition to the flat mesonotum. Epinotum slightly higher than the mesonotum, the basal face moderately convex and passing to the short, abrupt declivious face through a broadly rounded angle. Petiole from above quadrate with the anterior edge perfectly straight, the anterior angles broadly rounded. The anterior portion of the node has a virtually flat upper face but in the posterior half it is broadly and feebly concave. Seen from the side the node of the petiole has a straight upper border which passes to the vertical anterior face through a rounded angle and to the very short posterior face through a much sharper angle. Ventrally the petiole is constricted to form a very thick, short posterior peduncle and a much longer subtriangular portion which extends forward under the node and is narrowed in front to form the anterior peduncle.

Gaster slender, the first segment notably broader than long, segments two, three and four only slightly broader than long, the terminal segment somewhat longer than broad. Hypopygium deeply cleft in the middle, the lobes

rounded and fringed with abundant hairs; the pygidium bearing two small slender spine-like processes; sting prominent.

Legs rather short, the femora and tibiæ strongly compressed, the tarsal joints of the middle and hind legs all longer than broad. Fore tarsi shorter than the others, the first joint strongly bent, the third and fourth joints as broad as long. Claws well developed.

Smooth and shining throughout. The head with numerous rather coarse, piligerous punctures, those on the thorax somewhat smaller and sparser, abdominal punctures very much smaller and notably sparser. Head covered with short, erect hairs of approximately uniform length. Thoracic hairs sparser and of variable length. Edges of the node of the petiole covered with abundant, long, erect hairs. Hairs on the abdomen long, very slender and appressed, those bordering the edges of the segments somewhat stouter but borne parallel to the surface of the gaster. Apical portion of the middle and hind femora with numerous rather long erect hairs, the remainder of the appendages covered with shorter hairs, these being most abundant on the tarsi and funiculi.

Color, rich reddish brown throughout, the tarsi slightly lighter.

Taken by Dr. Herbert Ruckes about five miles west of Ft. Worth, Texas. Dr. Ruckes notes that the colony, which was a small one, was nesting beneath a large, flat boulder.

The female of *wheeleri* subsp. *dubia* can readily be distinguished from those of *opacithorax* and *schmitti* in the very different structure of the thorax. The prominent, median epinotal groove which is present in both the latter forms is completely absent in the new subspecies. Moreover in both *opacithorax* and *schmitti* the mesoepinotum of the female gradually increases in width from the promesonotal suture rearward. In the female of *dubia* the sides of the mesoepinotum are parallel except near the anterior end where a slight constriction occurs. In addition the head of the female in *opacithorax* and *schmitti* is more narrowed behind and the concavity in the upper face of the node of the petiole is very much deeper and extends entirely across the node to its anterior edge. I have not been able to com-

pare the female of the new subspecies directly with that of *carolinense,* but the excellent figure of the female of that species presented in Dr. Wheeler's publication of 1921 permits me to note the following differences: the sides of the head of *carolinense* are more convex, the occiput only feebly impressed, the epinotum in profile much more angular and no higher than the adjacent portion of the mesonotum.

It seems worth while to note in passing that the figure of the female of *Acamatus schmitti* given by Emery in the Genera Insectorum is incorrect in regard to the length of the legs. In Emery's figure the hind femora are as long as the greatest width of the thorax with the rest of the appendage proportionally shortened. The impression produced is one of a relatively short-legged insect, whereas, actually the legs of the females of *Acamatus* bear about the same proportion to the head and thorax as do those of the worker. Measurements of a female of *schmitti* in my collection show that the hind femora are one and one-quarter times longer than the greatest width of the thorax with the rest of the appendage uniformly longer, especially the tarsal joints which are almost twice as long as those in Emery's figure.

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A NEW CULEX, *CULEX VOMERIFER,* FROM PANAMA (DIPT., CULICIDÆ)

By W. H. W. Komp[1]

Incidental to other duties in connection with malaria investigations in the plantations of the United Fruit Company at Almirante, Panama, the writer made collections of the local Culicidæ as time permitted. Among the many rare and beautiful forms taken a new species of Culex was found. It is a *Mochlostyrax,* belonging to the section *Chœroporpa,* and like most of this group, is a small brown unmarked mosquito, not to be differentiated in any way from dozens of other species of the same group. Nothing is known of the life-history or of the immature stages. The description follows:

Culex vomerifer sp. nov.

Female: Unknown.

Male: A small brown Culex, with rather wide pale bands at the bases of the abdominal segments. Legs all black. Palpi with the last two joints exceeding the proboscis, and clothed with rather long stiff hairs. Terminalia of male: Side-piece rather conically produced, bearing a lobe. Outer lobe undivided, bearing the following appendages: the most mesial is a long simple filament with a sharply recurved terminal hook. Then in order are a small flattened filament about two-thirds the length of the preceding hooked filament. Next in order is a long, sharply acuminate filament, bent at nearly a right angle at one-half its length; this filament is laterally expanded at the bend, with the edges of the expansion directed inwards, forming a cup-shaped hollow in the angle of the filament. Next in order is a flattened filament, just exceeding the bend of the long preceding fila-

[1]Sanitary Engineer, U. S. Public Health Service. From the Gorgas Memorial Laboratory, Panama City, Panama.

ment. Then comes a small slightly flattened filament, with tip somewhat broader than the insertion.

Arising from a separate point of insertion in the outer lobe, and most dorsal in position, is a heavily sclerotized appendage, nearly as long as the mesial hooked filament. This appendage is bent upwards from the point of insertion to about one-third its length, then downwards to two-thirds

FIG. 1. *Culex vomerifer* sp. nov., male terminalia, ninth tergite and tenth sternite.

its length, and then is produced in line with its insertion. The tip of this appendage is flattened dorso-ventrally, thick, and bluntly pointed. A thin membranous expansion arises from a point near the insertion of this appendage, and is attached all along the dorsal edge, to a point about two-thirds the length of the appendage. This flattened membrane is somewhat incurved. The outer border of the membrane is sinuous, the edge arising abruptly from the point of attachment at the proximal end of the appendage, to its greatest elevation about one-third of the length, then curv-

ing downwards to form another elevated portion about three-fifths of its greatest height, then curving abruptly down to the distal end of its attachment to the appendage, which is at about two-thirds the length of this appendage. The membrane is an expansion of the dorsal border of the appendage. The appendage, with its membranous expansion, resembles a plough, the heavily chitinized tip forming the share, and the membranous expansion forming the mouldboard. As this is the most prominent and striking feature of the terminalia, I have named the species from this structure.

The inner division of the lobe of the side-piece is undivided, and bears two hooked filaments curved inwards (ventrally) at an obtuse angle. The more distal filament is somewhat longer than the other filament, and is sinuously curved, terminating in an expanded blunt tip. The shorter filament is sinuously curved, following the curve of the distal filament, and terminates in a rather sharper recurved tip. At the base of the inner division of the lobe are two or three setæ arising from conically produced bases.

The clasper is membranous, not much expanded, with pointed tip and appendiculate spine. A small spine arises from a protuberance on the inner aspect of the clasper, about one-fifth the distance from tip to base. The outer edge of the clasper is membranous, with rough torn irregular free margin. Two strong setæ about one-third the length of the clasper, arise from the angle between the clasper and the base of the outer lobe of the side-piece.

The ninth tergites are small, mound-like, rather heavily sclerotized, and are joined by a smooth bar about as long as the width of one of the tergites. The tips of the tergites are smooth, but the bases are clothed with long stiff setæ arising from protuberant bases.

The inner plates of the mesosome are T-shaped, the ends of the cross-pin of the T being produced to form sharp horn-like tips, which are directed mesially. The dorsal tip of the T is longer, thinner, and sharper than the ventral tip. The basal hooks are rather wide and membranous.

The tenth sternites are rather short, with seven or eight blunt teeth, which are long in proportion to the length of the entire sternite.

The type is a male adult, mounted on a double pin mount, the terminalia separately mounted on a glass slide. There are two co-types, also the male terminalia only, mounted in balsam. All have been deposited in the U. S. National Museum.

A NEW CULEX FROM PANAMA (DIPT., CULICIDÆ)

By W. H. W. Komp and D. P. Curry[1]

That the possibilities in the line of discovery of new Culicidæ in Panama are not yet completely exhausted, even after intensive work covering the last 25 years, is demonstrated by the many additions to our knowledge of this group which have been made during the past few years. Among the outstanding accomplishments in this field are the discovery of the larva of *Anopheles* (*Stethomyia*) *nimbus* var. *kompi* Edwards, of the larva and adult of *Anopheles* (*Chagasia*) *bathanus* Dyar, the separation of *Anopheles* (*Arribalzagaia*) *neomaculipalpus* Curry from *A. punctimacula* and *A. apicimacula*, with which it had been confused, the discovery of the occurrence of *Anopheles albitarsis* Arribalzaga, in Gatun Lake, and the separation of *Anopheles tarsimaculatus* Goeldi into two forms, a freshwater and a salt-water form, *A. aquasalis* and *A. aquacælestis*. In addition to these greater accomplishments, a minor one was incident to certain observations on Anopheles made in Mojinga Swamp, at the base of the peninsula whose tip is Toro Point, opposite Cristobal on Limon Bay. Here the authors made incidental collections of male Culex. Among the material a new species was found, which is here described.

Culex (Upsiloporpa) haynei, new species

Female: Unknown.

Male: A small brown Culex, unmarked in any distinguishing manner. The palpi exceed the proboscis by the length of the last two joints.

[1]From the Gorgas Memorial Laboratory, Panama City, R. de Panama.

Male terminalia: Side-piece somewhat conically produced, bearing a lobe. The outer division of this lobe bears appendages as follows: A long thick filament, with strong recurved hooked tip; two curved flattened filaments, about half as long as the preceding filament; a large membranous leaf, inserted near the base of the outer lobe, and nearly as long as the longest filament. This leaf is twisted about a quarter of a turn on its long axis, is finely striate, and curved outwardly (dorsally) and over the long filament.

FIG. 1. *Culex haynei* sp. nov. Male terminalia, ninth tergite and tenth sternite.

The inner division of the lobe of the side-piece is undivided, short, stout, and bears two filaments, the outer long, strong, and with curved hooked tip. The inner filament is about two-thirds the length of the outer, and is straight and much thinner.

The clasper is unique among those of the Culicidæ of the New World, and is sufficiently different from that of the other members of the genus Culex to warrant the erection of a section coequal with Helcoporpa, Dinoporpa, Mochlostyrax and Melanoconion. We propose therefore the name Upsiloporpa. The clasper is long and slender, narrowing slightly at about three-quarters of its length, and then expanding to form a somewhat Y-shaped furcate tip. The

arms are unequal, the inner being the shorter. The crest is markedly pilose outwardly. The appendiculate spine is attached near the terminal upcurving horn, and is unusually long, with a recurving hooked tip. There are two spines arising from small prominences, one at the junction of the furcation and the other proximal to the inner arm of the Y-shaped tip. The peculiar shape of the clasper can best be noted by reference to the figure.

The ninth tergites are ovoid, closely approximate, but not touching, with bare rounded tips. The bases are conically produced mesially, and bear numerous prominent tubercles, from which arise long, strong setæ.

The tenth sternites are rather long, with 7 or 8 strong blunt teeth.

The paired inner plates of the mesosome are T-shaped, the middle portion of the cross-bar of the T being somewhat rounded and elevated. The inner arm of the cross-bar is produced into a long pointed downcurving horn, while the outer arm consists of a short process set at an angle of about 45 degrees with the plane of the plate, and terminating in a truncate tip which is serrate, with four or five ragged teeth.

The type slide has been deposited in the U. S. National Museum.

NOVEMBER OBSERVATIONS ON *PIERIS PROTODICE VERNALIS* EDW. IN MISSOURI (LEPID. PIERIDÆ)

By Harold O'Byrne

Webster Groves, Missouri

The spring forms of some species of butterflies are occasionally seen in the fall. Scudder[1] says that the butterflies of *Pieris protodice* Bdv. & Lec. appearing late in the fall approach in coloration the spring type, and he attributes this to the cool nights. Comstock[2] mentions a similar occurrence in *Eurymus eurytheme* Bdv.; late fall individuals, presumably affected by the cold while in the pupal state, develop into the spring form *autumnalis* Ckll. instead of the summer form *eriphyle* Edw.

A noteworthy instance of this occurred in November, 1930, on the Ranken Estate near Valley Park, Missouri, when large numbers of *Pieris protodice* were seen, all of which had the coloration of the spring form *vernalis* Edw. Many of both sexes were observed on the mornings of November 9th, 16th, and 23rd, and all of the butterflies seen on the three days were flying in one small area; the west slope of a small valley that was exposed to direct sunshine and protected from the wind. Random collecting showed that there were nearly equal numbers of both sexes on each day of observation; nevertheless the eagerness of the males to mate caused them to cluster about the females as they were issuing from the pupæ, and make unsuccessful attempts to mate with them, even though their wings had just begun to expand. Several pairs were found *in coitu* on stems just above the voided pupal skins of the females, whose newly inflated wings were still soft.

Although the nights were chilly, this was an unusually mild November, and warm, sunny days continued nearly to the end of the month. If the coloration of the form *vernalis* is due to the effect of cold on the pupæ, then the observed

occurrence of this form can be regarded as a direct effect of the cool nights, while the late fall emergence was no doubt caused by the warmth of the sun on the sheltered hillside where the butterflies were seen. This was, therefore, an abnormal emergence of a brood that should have remained in the pupal stage until spring.

Any caterpillars resulting from the matings could hardly have been able to endure the cold weather and lack of food, though it was an unusually mild winter. However, such a winter would be very favorable to the survival of the adults, the females of which, having already been fertilized, would be able to oviposit quite early.

References

[1]Scudder, S. H. The Butterflies of the Eastern United States, p. 1169.
[2]Comstock, John A. The Butterflies of California, p. 51.

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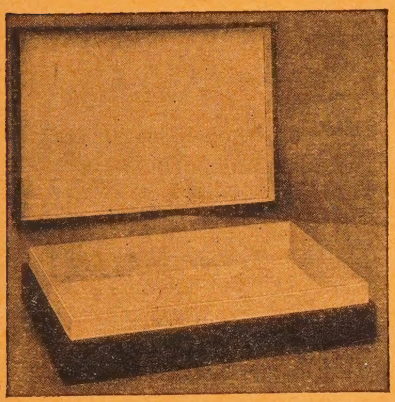

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